

Life Science

The student will demonstrate an understanding of scientific and engineering practices by **LS.1**

a asking questions and defining problems **LS.1.A**

- i ask questions and develop hypotheses to determine relationships between independent and dependent variables **LS.1.A.I**
 - ii offer simple solutions to design problems **LS.1.A.II**
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b planning and carrying out investigations **LS.1.B**

- i independently and collaboratively plan and conduct observational and experimental investigations; identify variables, constants, and controls where appropriate and include the safe use of chemicals and equipment **LS.1.B.I**
 - ii evaluate the accuracy of various methods for collecting data **LS.1.B.II**
 - iii take metric measurements using appropriate tools and technologies including the use of microscopes **LS.1.B.III**
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c interpreting, analyzing, and evaluating data **LS.1.C**

- i identify, interpret, and evaluate patterns in data **LS.1.C.I**
 - ii construct, analyze, and interpret graphical displays of data **LS.1.C.II**
 - iii compare and contrast data collected by different groups and discuss similarities and differences in their findings **LS.1.C.III**
 - iv consider limitations of data analysis and/or seek to improve precision and accuracy of data **LS.1.C.IV**
 - v use data to evaluate and refine design solutions **LS.1.C.V**
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d constructing and critiquing conclusions and explanations **LS.1.D**

- i construct explanations that include qualitative or quantitative relationships between variables **LS.1.D.I**
 - ii construct scientific explanations based on valid and reliable evidence obtained from sources (including the students' own investigations) **LS.1.D.II**
 - iii differentiate between a scientific hypothesis and theory **LS.1.D.III**
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e developing and using models **LS.1.E**

- i construct and use models and simulations to illustrate, predict, and/or explain observable and unobservable phenomena, life processes, or mechanisms **LS.1.E.I**
- ii evaluate limitations of models **LS.1.E.II**

f obtaining, evaluating, and communicating information [LS.1.F](#)

- i read scientific texts, including those adapted for classroom use, to obtain scientific and/or technical information [LS.1.F.I](#)
 - ii gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication [LS.1.F.II](#)
 - iii construct, use, and/or present an argument supported by empirical evidence and scientific reasoning [LS.1.F.III](#)
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The student will investigate and understand that all living things are composed of one or more cells that support life processes, as described by the cell theory. Key ideas include [LS.2](#)

- a the development of the cell theory demonstrates the nature of science; [LS.2.A](#)
 - b cell structure and organelles support life processes; [LS.2.B](#)
 - c similarities and differences between plant and animal cells determine how they support life processes; [LS.2.C](#)
 - d cell division is the mechanism for growth and reproduction; and [LS.2.D](#)
 - e cellular transport (osmosis and diffusion) is important for life processes. [LS.2.E](#)
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The student will investigate and understand that there are levels of structural organization in living things. Key ideas include [LS.3](#)

- a patterns of cellular organization support life processes; [LS.3.A](#)
 - b unicellular and multicellular organisms have comparative structures; and [LS.3.B](#)
 - c similar characteristics determine the classification of organisms. [LS.3.C](#)
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The student will investigate and understand that there are chemical processes of energy transfer which are important for life. Key ideas include [LS.4](#)

- a photosynthesis is the foundation of virtually all food webs; and [LS.4.A](#)
 - b photosynthesis and cellular respiration support life processes. [LS.4.B](#)
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The student will investigate and understand that biotic and abiotic factors affect an ecosystem. Key ideas include [LS.5](#)

- a matter moves through ecosystems via the carbon, water, and nitrogen cycles; [LS.5.A](#)
 - b energy flow is represented by food webs and energy pyramids; and [LS.5.B](#)
 - c relationships exist among producers, consumers, and decomposers. [LS.5.C](#)
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The student will investigate and understand that populations in a biological community

- a relationships exist between predators and prey and these relationships are modeled in food webs; [LS.6.A](#)

interact and are interdependent. Key ideas include [LS.6](#)

b the availability and use of resources may lead to competition and cooperation; [LS.6.B](#)

c symbiotic relationships support the survival of different species; and [LS.6.C](#)

d the niche of each organism supports survival. [LS.6.D](#)

The student will investigate and understand that adaptations support an organism's survival in an ecosystem. Key ideas include [LS.7](#)

a biotic and abiotic factors define land, marine, and freshwater ecosystems; and [LS.7.A](#)

b physical and behavioral characteristics enable organisms to survive within a specific ecosystem [LS.7.B](#)

The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic and change over time. Key ideas include [LS.8](#)

a organisms respond to daily, seasonal, and long-term changes; [LS.8.A](#)

b changes in the environment may increase or decrease population size; and [LS.8.B](#)

c large-scale changes such as eutrophication, climate changes, and catastrophic disturbances affect ecosystems. [LS.8.C](#)

The student will investigate and understand that relationships exist between ecosystem dynamics and human activity. Key ideas include [LS.9](#)

a changes in habitat can disturb populations; [LS.9.A](#)

b disruptions in ecosystems can change species competition; and [LS.9.B](#)

c variations in biotic and abiotic factors can change ecosystems. [LS.9.C](#)

The student will investigate and understand that organisms reproduce and transmit genetic information to new generations. Key ideas include [LS.10](#)

a DNA has a role in making proteins that determine organism traits; [LS.10.A](#)

b the role of meiosis is to transfer traits to the next generation; and [LS.10.B](#)

c Punnett squares are mathematical models used to predict the probability of traits in offspring. [LS.10.C](#)

The student will investigate and understand that populations of organisms can change

a mutation, adaptation, natural selection, and extinction change populations; [LS.11.A](#)

b the fossil record, genetic information, and anatomical comparisons provide evidence for evolution; and [LS.11.B](#)

over time. Key ideas
include LS.11

c environmental factors and genetic variation, influence survivability and diversity
of organisms. LS.11.C